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A Tabulation of Significant Changes

Made to the Design of the

Advanced Photon Source (APS)

Between February 1986 and March 1987

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1.0 Introduction

The purpose of this note is to document and enumerate the major design changes to the APS made during the period between February 1986 when the first Conceptual Design Report (CDR) was issued (ANL-86-8) and March 1987 as the final design changes are being made in preparation for the issuance of the 1987 version of the CDR. While the material which follows is by no means exhaustive, it represents the principal features affected by the redesign efforts. Some descriptions and relationships are provided, but no attempt has been made to explain or justify all of the changes.

2.0 Storage Ring Performance Parameters

The driving force for most design changes was the decision to increase the storage ring energy from 6 GeV to 7 GeV. The following table lists the resulting critical parameters:

<u>Parameter</u>	<u>1986</u>	<u>1987</u>	<u>Units</u>
Energy	6	7	GeV
Current (nominal operating)	100	100	Milliamperes
Current (peak design)	300	300	Milliamperes
Radiative Power			
Bending Magnet	6.0	6.6	Kilowatts
Average Undulator	2.0	6.5	Kilowatts
Average Wiggler	5.0	5.3	Kilowatts
Stored Energy (at peak design current)	6,355	7,414	Joules
Circumference	800	1,060	Meters
Straight Sections	32	40	
Beamlines	56	70	
Insertion Device Beams	28	35	
Bending Magnet Beams	28	35	

3.0 Site

The general site location is the same as depicted in the 1986 CDR except that the storage ring is now centered on Bluff Road about 850 feet to the south. The area utilized for the project as a whole has increased slightly due to the increased circumference of the storage ring, while the area used by the individual buildings is nearly the same.

4.0 Conventional Facilities

The table which follows compares the various building footprint areas of the two designs. The current design figures are the result of a much more in-depth study of personnel and project needs than were the earlier figures. The modest increase in area indicated for the experimental hall in light of its substantial increase in circumference is due to the fact that the photon beamline length was held constant and the outer-wall radius of this building is determined by the endpoints of these beamlines.

<u>Building/Purpose</u>	<u>1986</u>	<u>1987</u>
	(footprint area in square feet)	
Linac Building (linear accelerator and klystron gallery)	11,004	10,554
Synchrotron Injection (beam transfer area and synchrotron power supplies)	7,000	13,138
Synchrotron (earth shielded tunnel containing synchrotron ring)	11,478	13,915
Synchrotron Extraction (houses beam transfer power supplies)	6,864	6,470
RF Buildings (houses storage ring rf systems and ring magnet power supply)	31,500	21,600
Experimental Hall (houses storage ring and experimental floor)	328,000	334,836
Lab/Office Modules (lab and office space for users)	68,000	54,400
Central Lab/Office (lab and office space, control and computer rooms, shops, maintenance, and clean room)	69,300	88,875
Utility (houses cooling system and other utility support equipment)	15,000	21,600
Totals:	548,146	565,388

5.0 Radiological Considerations

Changes in beam energy and power, as well as changes in shielding design and DOE guidelines, have prompted recalculation of various radiological doses. For these reasons the corresponding figures for the 1986 design would not be comparable and so only the current design figures are listed.

Routine Operation: 0.04 mrem/hour for workers on the
 experimental floor or in offices or
 labs.

>10 mrem/year at the site boundary
(220 meters from the beam orbit),
based on 8,000 hours per year.

One-Shot Incident (sudden loss at a single point which is
internally investigated):

>100 mrem dose on the experimental
floor at the shield wall.

Residual Production: Residual production is expected to be
 minimal; however, detailed calculations
 are under way and will be provided later.

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